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V. S. L. Pate

ENTOMOLOGICAL NEWS

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V. S. L. Pate, 1903–1958 *

The recent death of Vernon Pate at Philadelphia, Pennsylvania, October 30, 1958, leaves the scientific world poorer by an extremely talented taxonomist. In a short period, 1929 to 1948, he published 92 papers. Many of these were revisions and generic reclassifications which establish him firmly as one of the world's foremost hymenopterists.

His primary interest was in the sphecoid wasps, principally in the subfamilies Nyssoninae, Pemphredoninae and Crabroninae. After obtaining his A.B. degree from Cornell University in 1928 he began an intensive study of the Oxybelini, and produced several short papers describing one new genus and several new species; two short regional papers on the oxybeline fauna of Algeria and the Philippines; and two outstanding, large papers on the Nearctic species of *Belomicrus* and *Enchemicrum* (1940). He never completed a revision of the Nearctic species of *Oxybelus,* assigned originally by J. C. Bradley as the thesis problem for his doctoral degree.

In the mid-30's Pate began publishing papers on the nyssonine-gorytine complex in the Nyssoninae and on the ammoplanoid complex in the Pemphredoninae. The most important contribution in the former series was a redefinition of the genera of Nyssonini (1938). The series on the tiny ammoplanoid wasps contained several valuable papers in which he described some new genera and a number of new species from the United States. The extent of his achievement on the ammoplanoids may be recognized when one realizes that of the currently valid taxa occurring in the United States 6 of the 9 genera and sub-

* The accompanying portrait of V. S. L. Pate was taken by R. E. Crabill in 1951.

genera and 27 of the 32 species and subspecies were described by Pate.

In the late 30's Pate developed a great and lasting interest in the extremely difficult group, Crabroninae. He published a number of valuable papers on these wasps between 1941 and 1948. His crowning achievement and most important single contribution to taxonomy was his masterful reclassification of the genera of crabronine wasps (1943). He submitted this work to satisfy the thesis requirements for his doctoral degree at Cornell. It displays the keen analytical powers and erudition that mark all of his major taxonomic efforts. It is certain that the basic concepts of classification established in this study will endure, even though subsequent workers may describe a few genera not known to Pate.

Although the majority of his papers were on the sphecoid wasps, he published worthy generic reclassifications of the Tiphiidae and Sapygidae in 1947. In addition, there were two basic nomenclatural studies that arose from his interests in wasp taxonomy. The earlier of these was a listing of the type species of genera and subgenera of the Sphecoidea, published as Memoir No. 9 of the American Entomological Society in 1937. The other was a similar listing of names applied in the Pompilidae, published in the Transactions of the same society in 1946.

Vernon had a very thorough and extensive knowledge of zoogeography and paleontology. In his more comprehensive papers he endeavored to apply knowledge from these fields in order to explain the probable evolution and distribution of a particular group of wasps. He was also a firm believer in the importance of biological characters in higher taxonomy, and many of his later papers utilize biological criteria to substantiate groupings based primarily on morphological grounds. Curiously enough, although he obviously realized the value of behavioral characters in elucidating taxonomy and gave fascinating lectures on the habits of wasps, he never published a single personal observation on wasp biology.

During the 30's he was interested in field collecting, and collected to some extent in the vicinity of Ithaca, New York, and

at Medford Lakes, New Jersey, where his family maintained a summer home. He participated with J. A. G. Rehn and J. W. H. Rehn in the Southwest Orthoptera Survey of the Academy of Natural Sciences of Philadelphia in 1937. In his early days at Cornell he was interested in limnology, and he worked for 7 summers, 1927 to 1933, for the New York State Conservation Commission on biological surveys of several of the streams and rivers in that state. In the summer of 1933 he collected insects and fossils in Kansas, Illinois, and Colorado with A. B. Klots and W. D. Sargent.

Each of us, in looking back over his own scientific career, probably can single out one teacher or colleague whose inspiration, advice and encouragement resulted in his selecting a particular field of specialization. In my own case he was Vernon Pate. His lectures in the advanced taxonomy course on the biology and taxonomy of the Hymenoptera, especially of the solitary wasps, were so stimulating and fascinating, that early in my entomological studies I decided to specialize on the same groups that engaged Pate's attention. His advice and encouragement during my undergraduate and graduate years were constant and inspiring. Other taxonomists who benefited from Pate's interest and encouragement were J. W. H. Rehn in Orthoptera, H. E. Evans in Hymenoptera, R. H. Arnett in Coleoptera, and R. E. Crabill in Myriapoda.

A generation of students will remember Pate's combined office and laboratory. One had to thread his way to the inner sanctum through a maze of insect storage cabinets and bookcases arranged as baffles. The air was blue from his chain-smoking, and cigarette ashes were dribbled liberally over the floor, tables and shirtfront of the occupant. These students also will remember the stimulating classroom and laboratory lectures that were made so vivid and meaningful by Pate's broad knowledge of biological fundamentals and his ability to relate these to the particular subject of discussion.

The honor that touched Pate most deeply was the recognition of the worth of his studies implicit in his election as a Life Member of the Academy of Natural Sciences of Philadelphia

and a Research Associate in Entomology. Writing to me from Cornell on May 4, 1938, he said: "Saturday [I] receive[d] two letters from Cadwalader the president notifying me that the Board of Trustees had a few days previously met and elected me a Life Member of the Academy and also Research Associate in Entomology. Rather took the wind out of my sails; they seem to go out of their way to be nice to me down there of late."

In his relaxed moments Pate was a delightful companion for the few who knew him well, and I recall with great nostalgia those happy golden years in the mid-30's. Pate and I would work all evening on our wasps, he in his long narrow office crammed with bookshelves and insect cabinets, I in one of the smaller labs across the hall where I shared working space with Jack Franclemont, Jack Cadbury, Derek Cross (now a physician), Verne Pechuman, Chakratong Tongyai from Siam, and, several years later, John Rehn. A frequent routine in spring and fall, after Franclemont returned from sugaring for moths and Cross came back from courting his future wife, would be a midnight visit by our quartet to the Lehigh Valley House for several rounds of beer or to Van Natta's dam for a highly refreshing swim.

Pate had a droll sense of humor that is preserved for entomological posterity in such names as *Lalapa lusa, Zyzzyx, Tea,* and *Java*. In response to my teasing him about some of the names proposed in his paper on the type species of pompilid wasps, he wrote June 7, 1947, as follows: "Furthermore I am deeply shocked that you would even consider I treat the sacred subject of nomenclature with levity. *Java* was proposed as a new name for *Dichelonyx* Haupt *nec Harris,* with the type *Java concolor* (Tasch.) which comes from Java. Hence the name, which is short and sweet, that is if you have any sugar these days for your coffee. Tea is probably an old Norse goddess or something. *Lalapa lusa* (named after the Palouse Indians of Idaho if you insist upon an etymology) is just out. And I have a n. gen. n. sp. from China which I have been wondering what to call (in the Gorytines). Will probably dedicate it to a ♀ grad student of Forbes, Da-si Pen, who has taken the Christian name

of Daisy. *Upsa dasi* would be a very nice euphonious name, don't you think."

It is most unfortunate that progressively poorer health, possibly occasioned by the declining health and death of his parents and an increasing teaching load, resulted in his virtual retirement from active taxonomy in 1948, and his untimely death 10 years later. He left uncompleted large revisionary treatments of the *Oxybelus* of North America and of the Crabronini of North and Middle America, and several shorter manuscripts.

Vernon Sennock Lyonesse-Liancour Pate was born in Philadelphia, August 31, 1903. He received his A.B. degree from Cornell University in 1928, and his Ph.D. degree in 1946. He was a summer assistant with the New York State Conservation Commission, 1927–1933, where he worked on stream surveys particularly of aquatic insects. He was a laboratory assistant at Cornell from 1927 to 1931, and instructor in taxonomy from 1932 to 1947. He held a 6-months temporary appointment in 1945 as Associate Entomologist in the Division of Insect Identification, U. S. Department of Agriculture; during this appointment he was stationed at the U. S. National Museum where he rearranged certain sections of the wasp collection. He was appointed Assistant Professor of Entomology at Cornell in 1948, where he taught General Entomology and acted as faculty advisor for students in entomology. He was also an Associate Editor or a member of the Editorial Staff of "Entomological News" from 1936 until 1953. He resigned from Cornell in 1952, and returned to Philadelphia. He worked at the Academy as a volunteer for some months before increasingly poor health caused the abandonment of these activities.

KARL V. KROMBEIN

The Occurrence of the Nasal Mite Speleognathopsis bastini Fain (Speleognathidae) from the Big Brown Bat, Eptesicus fuscus (Beauvois) [1]

By KERWIN E. HYLAND [2] and HEDWIG GEIGER FORD [3]

Fain (1958) reported on the occurrence of speleognathid mites in the nasal cavities of the bat, *Myotis myotis* (Borkh), in Belgium, and described the species as *Speleognathopsis bastini*. Earlier Fain (1955) had described *Speleognathopsis chiropteri* from the nasal cavities of several African megachiropterans (*Eidolon helvum* Kerr, *Epomophorus minor* Dobson) and *Boydaia duboisi* from a species of *Nycteris*.

A series of twenty-eight big brown bats, *Eptesicus fuscus* (Beauvois), collected on 2 August 1959, near Glen Rock, Pennsylvania, was examined for nasal mites and six bats were found to harbor a total of twelve female specimens.

These mites were compared with a paratype of *S. bastini* supplied by Alex Fain, Institut de Médecine Tropicale, Antwerp, Belgium, and are considered to represent this species in North America. Furthermore, this represents the first record of speleognathids occurring in the nasal cavities of bats on this continent.

Determined specimens have been deposited in the following collections: United States National Museum, Washington, D. C.; the Institute of Acarology, University of Maryland, College Park; and Institut de Médecine Tropicale, Antwerp, Belgium.

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[1] Contribution No. 106 from the Kellogg Gull Lake Biological Station, Hickory Corners, Michigan, U. S. A.

[2] Department of Zoology, University of Rhode Island, Kingston.

[3] Kellogg Gull Lake Biological Station, Hickory corners, Michigan.

New Species of Acrocera from Arizona and Ocnaea from California, with Synonymical Notes on the Genus Ocnaea (Diptera: Acroceridae)

By Evert I. Schlinger,[1] University of California Citrus Experiment Station, Riverside

This is one of a series of articles dealing with revisions, reviews or new species of acrocerid flies which have been prepared as a prerequisite to a generic revision of the family Acroceridae. A recent article of the series (Schlinger, 1960) cited references to most of the previous papers. Two new species of Acroceridae are described separately at this time in order to make their names available for inclusion in another concurrent work.

Subfamily Panopinae

Genus **Ocnaea** Erichson

Ocnaea Erichson, 1840, Entomographien, 1: 155.
Pialeoidea Westwood, 1876, Trans. Ent. Soc. Lond., p. 514 (type species, *Cyrtus magnus* Walker). NEW SYNONYMY.

The genus *Pialeoidea* was described by Westwood as a close relative of *Pialea* Erichson, but such is not the case (Schlinger, 1956). In fact, *Pialeoidea* species have been distinguished from *Ocnaea* species only on the basis of a female sex character, i.e., a group of apical setae on the terminal antennal segment. An examination of several female specimens of *Ocnaea helluo* Osten Sacken and *O. loewi* Cole has shown these specimens to contain the apical setae that characterize *Pialeoidea* species. Males of species in both genera are described as lacking the apical setae. Being unable to find other differentiating features between the two genera, I place *Pialeoidea* in synonymy with *Ocnaea*.

Ocnaea is a New World genus which comprises 20 species. To this number are now added the following five species: *Pialeoidea brasiliensis* Carrera, *P. gloriosa* Sabrosky, *P. metal-*

[1] The author would like to thank Dr. A. L. Melander of Riverside, California, for the loan of the type series of *Acrocera melanogaster*, new species.

lica Osten Sacken, *Cyrtus magnus* Walker, and *Ocnaea xuthogaster*, new species.

Ocnaea xuthogaster new species (figs. 1–3).

Male. Length of entire specimen 7 mm., wing length 5 mm.

Color black, yellow, and brown with some metallic blue reflections; black are eyes, occiput, ocellar tubercle, mesonotum, scutellum, most of pleura and tarsal claws; dark brown are antennae, antennal tubercle, ocelli, humerus and postalar callus (almost black), coxae, basal one-half of femur I, most of femora II and III, basal one-half of tibia III, apices of distitarsi, halter knob, costa, subcosta and R_1 wing veins, tergite I, large median spot on each of tergites II to VI, and most of genitalia; light brown are remainder of legs, remainder of wing veins, squamal rim, and small lateral spot on each of sternites III to V; yellow are remainder of abdomen and halter stem; metallic blue reflections are present in certain views of light on mesonotum, scutellum, upper pleura, and on all dark brown median tergal spots.

Pile light brown and dense on eyes and occiput, reaching out a little beyond tip of antennal segment I; that on thorax, coxae, squama, and abdomen yellowish white and dense, about as long as length of distitarsus III except more sparse and much shorter on abdominal sternites; that on legs yellowish white, short, dense, and appressed except longer and erect on base of femora and on trochanters; that on apices of distitarsi dark brown, about as long as a pulvillus; short light brown hairs are present on basal one-third of costal vein.

Head (fig. 1) nearly one and one-half times higher than long; antenna about one and one-fourth times longer than head height, segment III laterally compressed; antennae asetate except for short group of setae on dorsum of segment II; ocellar tubercle with slightly raised lateral ocellus; antennal tubercle small, barely produced above antennae; proboscis not evident, but minute proboscial covering present; eyes narrowly separated from antennae to frons.

Thorax shiny, but difficult to detect under its dense pile; each leg with distinct tibial spur, that on hind tibia about as long as

the length of antennal segment I; coxae subequal in length, but femur and tibia of leg III longer than those of leg II, and those of leg II longer than those of leg I; femur III nearly one and one-half times longer than femur I; squama nearly opaque; wing venation as in fig. 2; wing membrane transparent but distinctly creased and appearing somewhat smoky; scutellum almost twice as wide as long.

Abdomen shiny, quite narrow, widest at segment III; median spots on each of tergites II to V half-moon-shaped, those on II to IV broadly attached anteriorly, not quite reaching posterior margin of each segment and each spot separated from latero-anterior margin by distance equal to about one-fourth the width of each tergite; spot on tergite V similar in shape to that on IV except it is more broadly attached anteriorly and spot reaches out mediolaterally to touch lateral margin; spiracle I is in tergite I while other spiracles appear to be placed in intersegmental membrane; genitalia strong, aedeagus formed as in fig. 3.

Female unknown.

Holotype male. Benton Station, Mono County, CALIFORNIA, July 20, 1950 (H. A. Hunt), collected on window inside of house. The type locality is very close to Nevada at an elevation of about 6,500 feet. The holotype will be deposited in the California Academy of Sciences Collection in San Francisco, California.

This species is closely related to *O. sequoia* Sabrosky and somewhat less related to *O. helluo* Osten Sacken. It can be separated from both species by the male genitalia and wing venation. *O. xuthogaster* is also distinguished from *O. helluo* by its dark brown humeri, metallic blue reflections and yellow abdominal sternites, and from *O. sequoia* by its dark brown humeri and yellow sternites.

The specific name *xuthogaster* refers to the yellow abdomen.

SUBFAMILY ACROCERINAE

Genus **ACROCERA** Meigen

Acrocera Meigen, 1803, Illigers Mag. Ins., 2: 266.

This genus is cosmopolitan in distribution except for Australia and New Zealand, and contains about 45 valid species. The addition of the new species described below brings the total number of North American species to 17.

Acrocera melanogaster new species (figs. 4–7).

This species is a member of species group I as outlined by Sabrosky (1944). Species of this group are characterized by having vein R_{2+3} complete.

Male. Length of entire specimen 3.5 mm., wing length 3.5 mm.

Color black, brown, and pale yellow; black are eyes, occiput, ocellar tubercle, antennal segment I, frons, mesonotum, scutellum, metanotum, most of postalar callus, tarsal claws, and all abdominal tergites; dark brown are remainder of antennae, minute proboscis, ocelli, pleura, outer upper edge of postalar callus, coxae, apical half of distitarsi, wing veins, most abdominal sternites, and genitalia; pale yellowish brown are humerus, spiracular area immediately below humerus, small area below wing base, remainder of legs, faint posterior fascia on sternites II and III, halter knob and stem.

Pile white, very short over entire body.

Wing hyaline, venation strong, vein R_{2+3} complete (fig. 6); squama hyaline, densely covered with minute hairs; squamal rim narrow; abdominal tergite II flared out posterolaterally, somewhat inflexed anterolaterally; abdomen widest at segment III; tergite V somewhat emarginate medially; male genitalia as in figs. 4 and 5.

Abdomen and *thorax* are quite shiny.

Female. Same as male except pale yellowish brown areas are more yellowish white; area around prothoracic spiracle and intersclerotic area extending from spiracle to wing base is bone white; female genitalia (fig. 7) have extremely long cerci.

Paratype variation. Lengths of entire specimens range from 2.5 to 4 mm., wing lengths range from 2.25 to 3.75 mm. Some of the males have tergites IV and V very dark brown instead of black, have narrow whitish yellow posterior fascia on ster-

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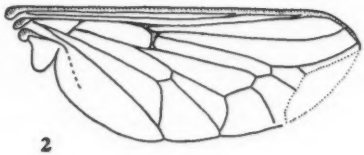

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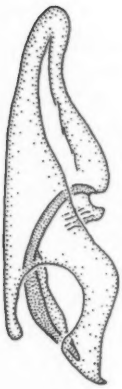

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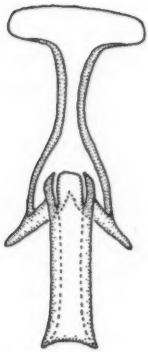

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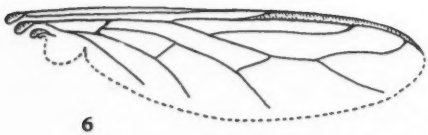

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EXPLANATION OF FIGURES

Figs. 1 to 3, *Ocnaea xuthogaster* new species; figs. 4 to 7, *Acrocera melanogaster* new species. Fig. 1, head in lateral view; figs. 2 and 6, wings; fig. 3, aedeagus in lateral view; fig. 4, aedeagus in ventral view; fig. 5, aedeagus in lateral view; fig. 7, female caudal abdominal segments and cerci in lateral view.

nites II and III, and have their genitalia lighter brown. No differences were seen between the two female specimens.

Holotype male. Globe, ARIZONA, October 9, 1935 (F. H. Parker).

Paratopotypes. 10 ♂♂, all collected on October 9, 1935, except 1 ♂, May 25, 1936, and 2 ♀♀, June 9, 1935 (all F. H. Parker).

The holotype will be deposited in the California Academy of Sciences Collection in San Francisco, California, and the paratopotypes will be placed in the collections of Axel L. Melander, United States National Museum, and the author.

According to Dr. Melander, the collector gathered all the male specimens on October 9, 1935, from a water pipe under the collector's house. It is also of interest to note that males were collected from May to October at the type locality, showing quite a range of occurrence in time.

This species is related to both *Acrocera arizonensis* Cole and *A. bakeri* Coquillett. It is most similar to *A. arizonensis* and will key out with *A. arizonensis* at couplet 5 of Sabrosky's key to the North American species of *Acrocera* (1948). It is separated from *A. arizonensis* by having all its abdominal tergites black instead of with only black spots, and in having most of the abdominal sternum dark brown instead of yellow.

The specific name *melanogaster* refers to the shiny black abdomen.

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Notes on the Biology of Scatopse fuscipes (Meigen) (Diptera: Scatopsidae)

By Alston B. Meade and Edwin F. Cook [1]

Introduction

The scatopsids are a small, economically unimportant family of Diptera. One species (*Scatopse fuscipes*) is occasionally a nuisance around canneries and wineries since it can develop large populations in very small amounts of decaying organic matter. This insect is easily reared under laboratory conditions. This quality, in addition to its relatively short life cycle, makes it ideal as a potential subject for ecological studies. An exhaustive search of the literature revealed that very little information is available on the biology of any of the scatopsids. This work is undertaken with the hope of supplying some of this basic knowledge, which will facilitate more extensive investigations.

Materials

The flies used in these experiments were from a culture reared in the laboratory for 3 years. They were fed on CSMA fly medium,[2] saturated with water, and allowed to ferment for 12 hours. The medium is placed in petri dishes or in 1 pint wide-mouthed jars in the fly cage, and kept quite moist. New medium is introduced as needed. Except when otherwise specified, the flies were reared at room temperatures and not under any precisely controlled conditions. Room temperatures in the laboratory varied from 75° to 80° F. with little or no variation between night and day temperatures. The cages used were 18″ × 12″ × 10″, of wood construction with a glass top, and with two small, sleeved openings for ready access.

[1] Paper No. 4406 Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

[2] The medium used here is the dry mixture prepared by the Ralston-Purina Company, St. Louis, Missouri and consists of 2 parts of soft wheat bran (coarse) and one part of alfalfa meal.

Adults

Mating behavior. The flies appear to be sexually mature on emergence, since copulation sometimes occurs when the adults are only 30 minutes old. Large numbers of mating pairs may be seen concentrated under petri dishes and in the corners of the cages. This concentration may be due to a negative response to light or to positive thigmotropism. Adults copulate for considerable periods and separate for varying periods, sometimes changing mates. An adult, presumably male, may try to separate a copulating pair presumably with a view to finding a mate. The adult stage seems to be devoted exclusively to reproduction and food is not consumed. If provided with a moist substrate, most females will oviposit.

Oviposition. Female *S. fucipes* oviposit 24 to 30 hours after emergence, and die shortly after oviposition. Most males live 30 to 45 hours.

Oviposition site. The following tests were made to determine the suitability of various sites for oviposition. A number of copulating pairs of flies were placed in two sets of three petri dishes each, one containing food resting on moist filter paper, another with moist filter paper and no food, and the third with only dry filter paper. After a few days, the dishes were carefully examined. The results (Table 1) show that the flies do not oviposit on dry surfaces. Eggs were found in all dishes except those containing dry filter paper. Some females from the latter group had strands of up to 30 eggs protruding from the genitalia. This suggests that, in the absence of moisture, oviposition may be initiated but cannot be completed. Dark areas, e.g., spots, or bits of food on filter paper, were always preferred sites for egg-laying.

Table 1.—Comparison of Several Sites for Oviposition

	Egg Masses	Females having Oviposited	Females still Gravid
Food	11*	12	1
Dry paper	0	0	12
Moist paper	8*	9	3

* Eggs laid by 1 female were apparently concealed and could not be found.

The egg mass. The eggs are released from the female in a long strand, each egg being attached at the ends to the preceding and succeeding ones, and this strand is folded lengthwise into a mass. The mass does not lie flat on the substrate, but is somewhat crescent shaped, so that the eggs appear to be pointed upwards. The eggs are arranged in rows, about six rows constituting the length of the mass. Ten egg masses were measured and the lengths ranged from 1.2 to 1.7 mm. and averaged 1.3 mm. The widest part of an egg mass occurs in the middle, while the ends taper gently. The width consists of about six eggs lying side by side. Shortly after oviposition the apical attachments of the eggs are broken. Occasionally an incomplete egg mass is seen, in which the eggs spread over a wider area, and are irregularly arranged.

The oviposition process. A gravid fly was placed on its back on moist filter paper and its abdomen pressed gently for a few seconds. Observation under a binocular microscope showed peristaltic movements in the segments close to the genitalia, and at each contraction an egg was released. The eggs came out in a long strand which soon formed a cluster. After about fifty eggs had been released, the rate of contraction was timed. For the next four minutes, the rate of contraction was 29, 28, 27, and 26 per minute, respectively. During the fifth minute the release of eggs ceased, but peristalsis continued for two minutes longer, the rate decreasing rapidly. The fly remained inactive and died after 90 minutes. On dissection, seven eggs were found in the ovary. Subsequent attempts to induce oviposition in other females were not successful.

Eggs

The eggs in the mass may be separated by placing them in 1% sodium hypochlorite. In a few minutes, complete separation is achieved and they may be easily counted. On January 10, five egg masses were counted. The number of eggs per mass ranged from 135 to 215, with an average of 189. On March 28, ten egg masses produced an average of 257 eggs per mass and ranged from 174 to 320. The difference in the egg production

of the two groups may have resulted from differences in food consumption during the larval stages.

Effect of temperature on incubation of eggs. The effect of temperature on incubation was studied by placing egg masses in hanging drops and exposing them to different temperatures until hatching. The results (Table 2) show that the lower threshold for hatching lies between 5° and 10° C. At the former temperature, no hatching occurred, while at the latter, hatching occurred in 16 days. Between 10° and 30° C., there was an inverse relationship between temperature and incubation period. At the temperatures: 10°, 15°, 20°, 25°, 30°, and 35° C. eggs hatched in 16 days, 189–206 hours, 120 hours, 72 hours, 47 hours, and 45–49 hours, respectively. The test failed to show any appreciable difference in hatching time at 30° and 35° C. We may reasonably assume that the upper threshold for hatching is a little above 35° C.

TABLE 2.—Effect of Temperature on Incubation of Eggs

Temperature	Rep. 1	Rep. 2	Rep. 3
5° C.	—*	—*	
10° C.	16 days		
15° C.	189–206 hrs.	189–206 hrs.	
20° C.	120 hrs.	126½ hrs.	
25° C.	72 hrs.	76–79 hrs.	72 hrs.
30° C.	47 hrs.	42–54 hrs.	
35° C.	41–49 hrs.	45½–49½ hrs.	

* No hatching occurred.

LARVAE

Duration of larval stage. One egg mass was placed in each of four dishes supplied with large amounts of CSMA fly medium. The duration from the hatching of eggs to pupation was noted. The data (Table 3) show that in the first dish the larval stage lasted from 12 to 15 days, in the second dish from 11 to 15 days, in the third dish, from 12 to 14 days, and in the fourth dish from 13 to 18 days.

Effect of inadequate food supply on larval growth. Egg masses were placed in four dishes which contained very limited

amounts of food. The eggs hatched on schedule, but during the next 49 days no pupae appeared in any of the dishes. Three dishes were then discarded and the fourth observed closely for an additional four months. Still no pupae had appeared, although the larvae remained active. Thus the larval period was extended to nearly seven months.

To determine whether food shortage accounted for the failure of the insects to pupate, the larvae from one of the discarded dishes were transferred to a chamber with adequate food. Four days later the first pupa was formed. Within 17 days, 49 insects had completed the larval stage. These findings indicate that the scatopsid larvae had a tremendous ability to withstand adverse conditions. Poor food supply can seriously retard larval growth, but can also prolong larval life.

Number of larval instars. The number of larval instars may be determined by counting the number of larval skins shed by an insect. In this experiment, the food medium was allowed to ferment, then it was filtered. Newly emerged larvae were reared on the filtrate and the number of molts recorded. Of the 23 insects which completed the larval stages, 17 underwent three molts each, while each of the remaining six were observed to molt twice. It is believed that on each of these six occasions, one molt was overlooked. Hence, we may conclude that the Scatopsid has four larval instars.

TABLE 3.—Duration of Larval Stage

Days after Hatching	Number of Pupae Appearing			
	Rep. 1	Rep. 2	Rep. 3	Rep. 4
11		6		
12	13	15	3	
13	8	11	2	7
14	3	5	1	6
15	1	2		12
16				28
17				7
18				5

Pupa

Duration of pupal stage. Pupae were placed on moist filter paper in vials, as soon as they were formed. Notes were made of the time required to complete the pupal stage. Three tests were conducted on different dates. In each test, the adult females emerged earlier than the males. However, the results for any given sex varied from one test to another. This is probably due to differences in room temperature at the time when the different experiments were performed. The duration of the pupal stage in 14 males ranged from 96 to 139 hours with a mean of 109.4 hours, while that of 11 females ranged from 86 to 126 hours with a mean of 97.6 hours.

Abstract

The life cycle of *Scatopse fuscipes* is completed in about 20½ days at room temperature. The approximate duration of the egg, larval, pupal, and adult stages are 3, 12, 4, and 1½ days, respectively. The females have shorter adult and pupal stages than the males. Within certain limits there is an inverse relationship between temperature and the incubation period of eggs. The larval stage may be prolonged if food supply is inadequate. Larvae have been known to survive for nearly 7 months under these adverse conditions. There are probably 4 instars.

Adults copulate as early as ½ hour after emergence from the pupae, and oviposit in 24 to 30 hours. Death occurs shortly after eggs are laid. Oviposition may be initiated in the absence of moisture, but cannot be completed under those conditions. Eggs are released by the female in a long strand which is folded into a cluster. The number of eggs laid by individual females ranges from 172 to 320.

Adults react negatively to light.

A New Nearctic Species of Stenoscinis, with Key to the Species of the Western Hemisphere (Diptera, Chloropidae)

By Curtis W. Sabrosky, Entomology Research Division, U. S. Department of Agriculture

The genus *Stenoscinis* was erected by Malloch in 1918 for the single species *Oscinis longipes* Loew, and *Oscinis atriceps* Loew was added later. A third and very distinctive species has recently been discovered in southern Arizona. I take pleasure in naming it for the collector and enthusiastic student of Diptera, Marian Adachi Kohn, who has furnished a drawing of the species (fig. 1).

Species of *Stenoscinis* are known in the Nearctic, Neotropical, and Ethiopian regions, those in the Nearctic apparently being Neotropical derivatives. The species from Arizona here described is most closely related to *S. major* (Duda), known from Costa Rica and Guatemala. Because of the new species and the reassignment of others, discussed below, I present a key to seven species, including the five that I recognize in *Stenoscinis* in the western hemisphere, and two in the related genus *Rhopalopterum*.

In 1929 (Konowia 8: 165–169), Duda published a short paper on the Chloropidae of the German Chaco-Expedition in which there appeared a new generic name *Rhopalopterum* (p. 167) associated with a known species, *Oscinella limitata* Becker and a new variety of it. The following year, in his revision of the Neotropical Chloropidae (1930, Folia Zool. Hydrobiol. 2: 107) that was probably expected to appear before the Chaco report, Duda proposed a new genus *Rhopalopternum* for *limitatum* (Becker) and *infumatum* (Becker). The difference in spelling is slight, and the two generic names certainly refer to the same genus. In 1931 (Folia Zool. Hydrobiol. 3: 166), Duda designated *limitatum* as the type-species of *Rhopalopternum*. In 1934, he added three new species, and gave a key to the known species (Konowia 13: 58–69, 101–110).

For some time I considered *Rhopalopterum* as a synonym of *Stenoscinis*. However, it may be that the former can be maintained for *limitatum* and *flavicorne* Duda (1934). These species are characterized by a more developed anal region of the wing; short, *Oscinella*-like discal cell; 1 + 1 strong notopleural bristles; and short, apically subtruncate scutellum with widely separated apical scutellar bristles set on small tubercles. Of the four remaining species included by Duda, *R. majus* Duda and *R. antiguense* Duda are here referred to *Stenoscinis* (new combinations), and *R. infumatum* (Becker) is actually a *Lasiopleura*. I have not seen the type of *R. limitatum* var. *glabrum* Duda, but it may not belong. A specimen from Alhajuelo, Panama, March 4, 1912 (A. Busck) [U. S. National Museum], determined by Duda as *glabrum*, is *Monochaetoscinella anonyma* (Williston).

In 1936, in reviewing the Nearctic species of *Oscinella* and *Madiza* (Ent. Soc. Amer. Ann. 29: 707–728), I synonymized *Stenoscinis* with *Oscinoides* Malloch, an entirely erroneous association as I soon realized and later noted in print (1951, Ruwenzori Expedition, 1934–5, British Museum (Natural History), vol. 2, no. 7, pp. 808–809).

Key to Species of Stenoscinis of Western Hemishere

1. Frontal triangle large, broad to apex, projecting shelflike above bases of antennae; occiput strongly developed, viewed from above ⅓ length of eye, subtruncate; ocellar bristles proclinate and divergent; large species, 3–4 mm..2

   Frontal triangle not so, ending at or near anterior margin of front, the apex acute or only slightly broadened; occiput not strongly developed; smaller species, 1.5–2 mm.....3

2. Cheek linear; front only slightly projecting; fore coxae and all femora except apex of third, yellow; one row of hairs along each side of frontal triangle (Costa Rica, Guatemala).....**S. major** (Duda), n. comb.

   Cheek broader, one fourth height of eye; front strongly projecting, over half length of eye in front of eye; fore coxae and all femora except knees narrowly, black; two rows of hairs along each side of triangle (Arizona).....
   .....**S. adachiae,** new species

3. Second costal sector obviously shorter than third sector (0.75); ocellar bristles erect and cruciate (Neotropical).. **Rhopalopterum limitatum** (Becker), **R. flavicorne** Duda
Second costal sector equal to or obviously longer than third sector.....4
4. Ocellar bristles erect and convergent to tips or cruciate; second costal sector obviously longer than third sector; mesonotum shining.....5
Ocellar bristles proclinate and divergent; second and third costal sectors equal; mesonotum usually with broad median stripes of fine gray tomentum (United States).....**S. longipes** (Loew)
5. Legs entirely yellow; frontal triangle ending acutely well short of anterior margin of front (e. United States, se. Canada).....**S. atriceps** (Loew)
Legs black except for trochanters and knees; frontal triangle extends to anterior margin of front, ending bluntly (Guatemala).....**S. antiguensis** (Duda), n. comb.

STENOSCINIS Malloch

Stenoscinis Malloch, 1918, Brooklyn Ent. Soc. Bul. 13: 21. Type species, *Oscinis longipes* Loew, by original designation and monotypy.

The slender, elongate form of body, legs, and wings, with the reduced anal area of the wing, distinguishes this group from *Oscinella* and related genera of the Oscinellinae. Typically, the eye is large and the cheek linear and inconspicuous. The type-species has the ocellar bristles proclinate and divergent, a character not common in the Oscinellinae, and this character is indeed found in a number of species referred to the genus. However, in a few species that represent a transition from *Oscinella* and related genera, the ocellars are convergent to tips or cruciate. Otherwise they have the typical structure of *Stenoscinis,* and I have referred them to the genus (see discussion by Sabrosky 1951, op. cit. pp. 808–809).

Typically, *Stenoscinis longipes* has a broad median stripe of pollinosity or fine tomentum on the mesonotum. In a few specimens, this is reduced to a prescutellar band, leaving the mesonotum more highly shining. The male genitalia of the shining and pollinose forms are the same, however, and for the present at least I consider the shining form only a variant.

Stenoscinis adachiae, new species (Fig. 1)

Head elongate; frontal triangle broad throughout and occupying most of front; cheek distinct.

Male, female.—Black, only the halteres, trochanters, knees, fore and mid tibiae, basal two-fifths of hind tibiae, most of fore basitarsi, and the two proximal segments of mid and hind tarsi, yellow; veins and wing membrane brown, both yellowish on basal fourth of wing; hairs chiefly whitish yellow; bristles chiefly yellow, the apical scutellars black.

Head (fig. 1) broader than thorax, and almost as broad as long, but appearing elongate, front projecting over half the length of an eye in front of the eyes, occiput extending one-third the length of an eye behind them and subtruncate in dorsal aspect, hind margin of head nearly straight; eyes with sparse, microscopic pubescence; front broad, nearly three times the width of an eye; frontal triangle large, occupying most of front, narrowly separated from eyes and of nearly equal width throughout, only slightly tapered and ending broadly anteriorly, extending shelflike over the antennal bases; surface of triangle smooth and polished, with two rows of piliferous punctures along each side, one on the very edge; head in profile almost 1.5 times as long as high, face extremely oblique because of projecting front, and the vibrissal angle obtuse; long axis of eye diagonal; cheek narrow, one-fourth the height of an eye and one-fifth the height of head; face narrow, polished, with sharp facial carina and deep antennal grooves; median clypeal plate large, polished, appearing continuous with face; oral opening small, mouthparts likewise. Antennae with third segment as long as broad, but not completely orbicular; arista pubescent. Chaetotaxy of head weakly developed, only the outer vertical bristles strong, the proclinate and divergent ocellars and the postverticals but little stronger and longer than frontal hairs.

Mesonotum narrow, 1.24 times as long as broad, with numerous strong piliferous punctures; thorax shining, with gray tomentum only on notopleuron, narrowly above base of wing, posterodorsal corner of mesopleuron and anterodorsal corner of pteropleuron, squamopleuron, narrow prescutellar area, and scu-

tellum; latter relatively large, broadly rounded apically, evenly convex without distinct margins, the median area slightly rugose and with numerous hairs. Chaetotaxy: 1 + 2 notopleural, 1 postalar, 1 subapical and 1 apical scutellar pairs of bristles, only the lower posterior notopleural, postalar and apical scutellars strong; apical scutellars well separated, the subapicals close to apicals but weak and scarcely distinguishable from hairs.

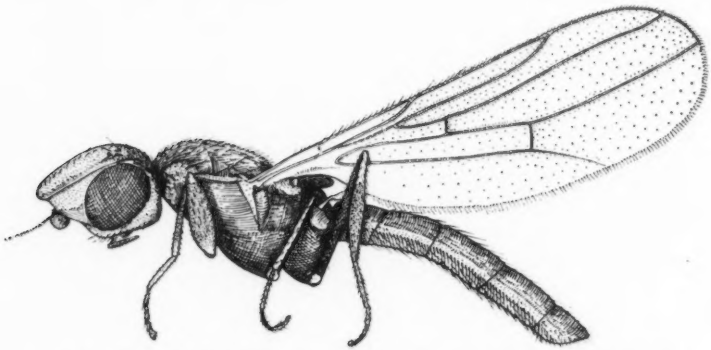

FIG. 1. *Stenoscinis adachiae*, n. sp. Side view, the head turned slightly to show the large frontal triangle.

Abdomen slender and elongate, narrower than thorax and nearly twice as long.

Legs relatively slender and elongate, the hind legs especially so; "sensory area" on hind tibia narrow, barely over one-fourth the length of tibia.

Wing as figured (fig. 1), the second costal sector only slightly longer than third sector, first posterior cell broadening distally, fore crossvein beyond middle of discal cell, and anal region of wing narrow.

Length of body and wing, 3.5 mm. (male), 4 mm. (female).

Holotype, male, *allotype*, and one *paratype* (male), Catalina Mts., ARIZONA (Milepost 10, Hitchcock Highway), Aug. 13, 1958 (M. Adachi). Type No. 65458 in the U. S. National Museum.

New North American Records of Pepsinae and Ceropalinae (Hymenoptera: Pompilidae)

By Frank E. Kurczewski, Allegheny College, Meadville, Pennsylvania [1]

The records presented below are based upon two summers' collecting in Erie and Crawford Counties, Pennsylvania. The majority of specimens were captured on flowers while a few were taken nesting.

This list is presented with hopes of filling in existing gaps in the western Pennsylvania collecting records. The record for *Ageniella fulgifrons* is believed to be the most northern in northeastern United States while that for *Chirodamus fortis* is believed to be the most northern, definite record of its range in North America. There has been one collection of *C. fortis* labelled vaguely "NY" (Leonard, M. D. 1926. A List of the Insects of New York, Ithaca, N. Y.).

Subfamily Pepsinae

Chirodamus fortis (Cresson). Crawford Co., Cambridge Springs, June 29, 1 male on *Pastinaca sativa*. Frenchtown, July 3, 1 male on Salicaceae.

Priocnemioides unifasciatus unifasciatus (Say). Erie Co., Erie, July 22–August 8, 3 males and 2 females on *Daucus carota*.

Priocnemis minorata Banks. Crawford Co., Blooming Valley, May 3, 1 female under dead leaves on forest floor, 1 male as it alighted on violet leaf. Frenchtown, May 4–May 8, 1 female under dead leaves on forest floor, 1 female from moist mud near water puddle, 1 male on dead leaves near stream, 1 male in flight.

Priocnemis cornica (Say). Crawford Co., Meadville, September 30, 2 females on gravelly, sunny bank dragging small Lycosidae, probably *Pardosa sp.*, backwards.

[1] Present address: Department of Entomology, Cornell University, Ithaca, New York.

I should like to express my appreciation to Dr. R. E. Bugbee, Allegheny College, for his encouragement and for reading the manuscript and to Dr. Howard E. Evans, Cornell University, for checking the identities of the species involved and for advice regarding the latest taxonomic reviews on the subject.

Calicurgus hyalinatus alienatus (Smith). Crawford Co., Meadville, June 23, 1 female on outside of window. Cambridge Springs, June 29, 1 female on *Pastinaca sativa.*

Dipogon sayi sayi Banks. Erie Co., Presque Isle State Park, June 8, 1 female running over trunks of freshly-cut trees.

Phanagenia bombycina (Cresson). Crawford Co., Meadville, October 30?, 1 female, no other data (L. M. Byers, collector).

Auplopus architectus architectus (Say). Crawford Co., Meadville, May 19, 1 female as it alighted on ivy leaf.

Auplopus nigrellus? (Banks). Crawford Co., Meadville, October 6, 1 female, no other data (L. W. Byers, collector).

Ageniella fulgifrons (Cresson). Erie Co., Erie, July 25, 1 female on *Daucus carota.*

Subfamily Ceropalinae

Ceropales maculata fraterna Smith. Erie Co., Erie, August 16, 1 male on *Daucus carota.* Crawford Co., Cambridge Springs, June 29, 1 female on *Pastinaca sativa.*

Ceropales bipunctata bipunctata Say. Crawford Co., Meadville, August 20, 1 male on *Solidago sp.*

Host Specificity of Fleas from Kangaroo Rats

By C. Andresen Hubbard, Tigard 23, Oregon

With the exception of the siphonapterist few naturalists recognize the specificity of a flea to its natural host. While working the fleas of the kangaroo rats of northern California these last few months the writer made his way into Surprise Valley in extreme northeastern Modoc county. The Valley, a few miles more than 60 long and at no point more than a stone's throw west of Nevada, has on its floor three dry lakes (alkali flats most of the year) named, of course, Upper, Middle, and Lower Lake. To the west are the high Warner Mountains, to the east what natives call the Nevada Hills. Cedarville, the chief town in the valley, is at the north end of Middle Lake and farther north by 25 miles is Fort Bidwell at the north end of Upper Lake. There is no natural barrier of any type between the towns.

During mid October 1960 the writer trapped 9 kangaroo rats east of Cedarville in the sand beyond the bed of Middle Lake, and a like number of them 4 miles east and north of Fort Bidwell. About 2 dozen fleas were removed from each batch.

Several days later in his laboratory, with the kangaroo rats still quite alive and comfortable, the writer processed the fleas and found that the Cedarville specimens were carrying only *Meringis dipodomys,* and that the Fort Bidwell specimens carried only *Meringis cummingi,* the former the flea of the kangaroo rat *Dipodomys microps,* the latter the flea of the kangaroo rat *Dipodomys hermanni.* But all mammalian records said Surprise Valley housed only *Dipodomys microps.* Had the fleas made a mistake? The writer hardly thought so, and therefore, even though the 18 kangaroo rats from Surprise Valley all looked alike, they were destined to be shipped alive to Dr. Murray Johnson, surgeon of Tacoma, Washington, working at the University of Puget Sound on National Science Foundation Project 10831 "serum proteins and hemoglobin electrophoresis of mammals." Dr. Johnson after processing the kangaroo rats reported to the writer that the fleas had not made a mistake, that the specimens from Cedarville were *Dipodomys microps aquilonius* and that the specimens from Fort Bidwell were *Dipodomys hermanni* (Northern California kangaroo rat).

This short paper is the second of a series to be published by the writer under National Science Foundation Grant B 8645 on American fleas; it shows the specificity of these fleas to their host, and expands without doubt the range of the kangaroo rat *Dipodomys hermanni* southeast from Swan Lake Valley, Oregon, where Applegate collected it in 1898 and where the writer has collected it year after year, by 100 miles or so to the south and east, probably out of Oregon through the northern draw into Surprise Valley, California, and with the kangaroo rat its flea *Meringis cummingi.* Since there is no break in the terrain this kangaroo rat and its flea probably range east into Nevada where the host and its hitch-hiker have not yet been recorded. The records:

Meringis dipodomys Kohls 1938

From 9 *Dipodomys microps aquilonius* (Chisel tooth kangaroo rat), Cedarville, Modoc county, California, October 16, 1960, 20 males, 18 females, as follows, 1-2-4-6-1-0-16-4-4.

Meringis cummingi (C. Fox) 1926

From 9 *Dipodomys hermanni californicus* (Northern California kangaroo rat), Fort Bidwell, Modoc county, California, October 17, 1960, 12 males, 11 females, as follows, 6-2-0-12-2-0-0-1-0.

The skins of the above hosts are in the collection of the museum of University of Puget Sound, the fleas are divided evenly between the United States National Museum and the British Museum.

Notes and News in Entomology

Under this heading we present from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

IVth International Congress U. I. E. I. S.

The International Union for the Study of Social Insects asks that applications for the reading of papers at the Fourth International Congress be sent in as soon as possible, and not later than March 31st. The Congress will be held in Pavia, September 9th to 14th, 1961. It is planned to present symposia on endocrinology, caste differentiation, symbiosis, and on gregariousness and sub-social states. Sections will be held on termites, ants, bees and wasps, and on applied research. Publication of the Proceedings is assured. Applications for membership in the Congress (full members, $8.00, Associate, $4.00) should be made before April 30th. Membership cards will be mailed, and applications for accommodations in hotels and University Colleges. Address: Segreteria del IV Congresso Internazionale U. I. E. I. S., Instituto Spallanzani, Universita, Pavia, Italy.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nichiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Domminck J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Nitidulidae and Rhizophagidae wanted in exchange for European beetles of all families. O. Marek, Zămberk 797, Czechoslovakia.

Wanted and Needed. We are compiling a history of entomology, and particularly, at present, of the amateur insect clubs that flourished 50 to 75 years ago. Will you who have knowledge of such early clubs or societies advise me, giving facts on the time of existence, members, etc., which you may have. J. J. Davis, Dept. of Entomology, Purdue University, Lafayette, Indiana.

Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

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By William T. Keeton

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